

MATH 12 Winter 2020

Precalculus

MWF 3:10-4:00 pm, Room: SOCSCI 1100

(This syllabus may be updated as needed; for the current version, see Canvas)

Instructor: Peter R. Merkx

-**Email:** pmerkx@math.ucdavis.edu

-**Office:** MSB 1105

-**Office Hours (in Academic Surge 2142):** MWF 4:15-5:15 pm, and by appointment

Course TAs & office hours:

-Joshua Parker (jdparker@math.ucdavis.edu)

Office hours (in Academic Surge 2142): T 4-6pm, R 5-7pm

-Louis Ng (lcng@ucdavis.edu)

Office hours (in Academic Surge 2142): MWF 5-7pm

Textbook: *Precalculus, 2nd edition* (ISBN 978-0077276508) by John Coburn. (An electronic copy is available in the ALEKS system.)

Exam dates: Any changes to the following dates will be announced.

Midterm 1 Friday, January 31, 3:10pm-4:00pm.

Midterm 2 Friday, February 28, 3:10pm-4:00pm.

Final Exam Friday, March 20, 6:00pm-8:00pm.

Course description: This course is designed as preparation for our calculus classes. We will study topics including solving inequalities, simplifying algebraic expressions often encountered in calculus, graphing functions, treating translations, reflections, and compressions of graphs. We will emphasize properties of logarithmic, exponential functions, trigonometric, and inverse trigonometric functions with a focus on skills relevant in calculus courses including solving optimization problems.

Prerequisites: Two years of High School mathematics with a core of topics in algebra, plane geometry, plane trigonometry. One must also satisfy the Mathematics Placement Exam (to **avoid being dropped automatically** by university administration).

Grade: We will have weekly homeworks, two midterms, and a cumulative final exam. Your grade in the course will be based on all of this work. The lowest homework score will be dropped. The final course grade will be computed with the following weights.

Homework - 20%, Midterm 1 - 20%, Midterm 2 - 20%, Final Exam - 40%

Homework: We will have online homework through the ALEKS system (see our Canvas for details announced there during the first week of classes). Discounted access to this system and an electronic copy of our text is available through UC Davis Inclusive Access Program. Late homework may not be scored, but *you should do all exercises* in any case. We may also have optional, ungraded homework (not to be handed in) posted in our Canvas. You should do these.

Exams: Calculators will *not* be allowed on exams. Midterms will be held during the usual class time. Midterms and final exam will be held in our usual room unless announced otherwise.

Missed exams: There will be no makeup exams except in (documented) extenuating circumstances. Please let me know as soon as possible if you miss an exam. Any excused exam scores

will in most cases be replaced appropriately based on grades on remaining coursework rather than by a makeup exam.

Help: Please let me know immediately when something is not clear, both in class and out. While you should expect to spend a significant amount of time reading your text, it is crucial for success in the course (both yours and mine) that you bring any topic that is not making sense to my attention. Often, a short chat about a topic can save hours of chasing through our text. We will also have graduate TAs and undergraduate LAs working for the course who together are available to you for multiple hours each day. Other options for help include the following.

- Office hours: Please feel free to attend my office hours to discuss homework problems or any other aspect of the course. If your other obligations prevent coming during the usual times, please let me know so that we can schedule a meeting.
- Meeting with one of our TAs during their office hours or by appointment.
- Tutors & help sessions through the UC Davis Academic Assistance and Tutoring Centers: <https://tutoring.ucdavis.edu/>
- Private tutors: <https://www.math.ucdavis.edu/resources/learning/tutors/>
- A Student Solutions Manual containing complete solutions to odd-numbered textbook exercises is available for a low cost and is recommended for making extra practice efficient.

Suggestions: Obtaining a print version of the textbook will likely be very helpful in addition to the electronic text that comes with the ALEKS system included with our Inclusive Access (IA). You should “opt-in” for Inclusive Access unless you already have purchased ALEKS system access on your own. We may discuss topics in lecture that are not covered in our textbook and *vice versa*. We may also not have time in lecture to cover every topic found in the homework exercises. This makes both attendance and careful reading of the sections we cover in your textbook essential. In addition to our text, you may benefit from expositions in some of the many other well written precalculus textbooks and online resources.

Computer algebra software (CAS) may be helpful though you can (and should) complete nearly all homework exercises without it. Sage is an excellent, extremely powerful open-source (free) CAS system with many contributors including some UC Davis faculty members. Mathematica is also well suited for our purposes and available with a student discount; the related, more limited, online Wolfram Alpha, is available freely, is flexible in syntax, and adequate for most of our purposes. Calculators can be used instead but are less flexible, more time consuming, and not recommended to be purchased only for this course. No CAS or calculators will be allowed for exams.

Academic Integrity: You may discuss homework problems with your classmates, but you should be working out solutions on your own. You are expected to follow UC Davis policies on academic integrity.

Students with Disabilities: It is the policy of UC Davis to provide reasonable accommodations to students with documented disabilities. Students are responsible for registering with the Student Disability Center (SDC). Please make requests known to me in a timely manner. If you require accommodations in this class, please let me know as soon as possible so that arrangements can be made. If you believe that you need accommodations for a disability, please contact the SDC to discuss your needs and the process for requesting accommodations. For more information, please visit: <https://sdc.ucdavis.edu>.

It is your responsibility to keep informed of any announcements made in class and by email/Canvas during the semester.

Course Outline: We will aim to cover the following topics, time allowing.

1. Essentials

- Interval notation, absolute value, factoring
- Completing the square, quadratic formula
- Distance formula, midpoint formula
- Lines, symmetry, circles
- Solving inequalities

2. Functions

- Functions, difference quotients, domains
- Graphs of functions, shapes of graphs, average rates of change
- Translations, reflections, composition of functions
- Inverse functions

3. Applications of functions, graphing

- Quadratic functions
- Setting up functions in applications
- Max-min problems
- Graphing polynomials
- Graphing rational functions, polynomial division

4. Exponential and logarithmic functions

- Exponential functions
- Logarithmic functions
- Properties of logarithms
- Solving equations with logs and exponentials
- Exponential growth and decay

5. Trig functions

- Trig functions of acute angles
- Right angle applications
- Trig functions of angles
- Radian measure and geometry
- Trig functions of real numbers
- Graphs of sine and cosine
- Angle addition formulas, double angle formulas
- Trig equations
- Inverse trig functions

6. Roots, factors, expanding

- Pascal's Triangle, Binomial Theorem
- Factor Theorem, Rational Roots Theorem